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ABSTRACT

This study is an effort to determine possible service performance levels in hospital libraries, based on access to the scholarly record of medicine through selected lists of clinical journals and indexing and abstracting journals. Specific emphasis is placed on (1) the citation verification through the use of the index and abstract journals, (2) the costs of verification in terms of possible levels of performance, (3) the accessibility of information through these instruments, and (4) the means to begin to define part of the function of hospital health science libraries under present institutional constraints. This study was designed to test a methodology as well as to provide data for planning and management decisions for health science libraries and library materials. The citations in a sample generated from one quarter's production of a core set of journals suitable for a hospital health science library were verified in bibliographic tools and the data were analyzed through graphic means. Findings and conclusions cover the value of a core collection of journals, length of journal files, performance of certain bibliographic instruments in verifying citations for interlibrary loan service, and the implications of study data for library planning and management. (Author/JB)

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REPORT

No. 54

A Study of the Access to the Scholarly Record From a Hospital Health Science Core Collection

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SCHOOL OF MEDICINE
Library and Biomedical
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Detroit, Michigan

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A Study of the Access to the Scholarly Record From a Hospital Health Science Core Collection *

Report No. 54

by

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and

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Detroit

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INTRODUCTION

The hospital is the center of health services activities in the community. This imposes an important role on the hospital health science library in that it must assume a responsibility in the dessemination of information to members of the health professions. The scientific journal has been, and still is, the basic unit of the scholarly record of medicine and better access to journal literature is of major importance to the improvement of our medical communications system.

Perhaps when the electronic age has matured, libraries will be different from what they are now, but libraries still must have three components, a collection of materials, people to maintain and to make the collection accessible, and space for the materials and people. Hospitals are expected to have libraries, but what kind of library? The only model available to imitate is the academic resource medical library. Hospitals,however, cannot, or ought not, be expected to match them in collections or space. This study is an effort to determine possible service performance levels in hospital libraries as related to access to the scholarly record of medicine through a selected list of clinical journals and a selected list of indexing and abstract journals. Specific emphasis is placed on (i) the citation verification through the use of the index and abstract journals, (ii) the costs of verification in terms of possible levels of performance, (iii) the accessibility of information through these instruments, and (iv) the means to begin to define part of the function of hospital health science libraries under present institutional constraints. Although the general method of citation counts has been used to investigate information problems, the analysis of the resultant data has not been applied to the planning and managing of hospital health science libraries.

THE HOSPITAL HEALTH SCIENCE LIBRARY

The services given through a hospital health science library may be similar as an academic library; however, the priority of services differ in the two institutions. The hospital library must be organized to provide information to support patient care. Without this prime objective, the library becomes other than a hospital library. Along with this responsibility is the task of supporting educational and training programs, and in some hospitals, of supplying materials for research staff. Health professionals obviously need access to current knowledge. The amount of research has been doubling every 10 to 15 years, if measured in terms of literary output. The number of papers published yearly in biomedicine is more than several times the number in chemistry, biology, and agriculture. (1) Obviously, a hospital cannot be expected to collect and to house this scientific output. If the library is located within the physical plant of the

hospital, it occupies space that could be used for patient care. The cost for providing space for a library should be computed in terms of its direct usefulness and must be related to the expense per patient day instead of just construction costs. Even though the hospital may find funds outside its patient care income to support the library, this is merely a subtefuge since ultimately it must be calculated in health care delivery. In 1968 the expense per adjusted patient day for community hospitals was $55.80 and the costs are continuing to rise. (2)

Space is always at a premium in a hospital. The present increase in hospital services and personnel causes an increase in the number of square feet needed per bed. A hospital of over 100 beds needs to provide 850 square feet per bed. In teaching hospitals the requirements may be over 1200 square feet per bed. In 1967 the project cost per square foot for a university teaching hospital built under the Bill-Burton Program was $65.22. (3) Hospital construction costs are going to continue to rise, and in some metropolitan areas has arisen to over $100 per square foot. Every square foot of library space must, therefore, be justified.

Since there is a constraint on the amount of the scholarly record that a hospital can own, this still does not relieve the hospital of providing access to the remainder of the scholarly record. Obviously, the hospital must have an interlibrary loan service. The interlibrary loan code prepared by the Interlibrary Loan Committee of the American Library Association Reference Services Division in 1968 stipulates that items requested should be verified and sources of verification given. This means that the borrowing library should have a collection of bibliographic tools for verification purposes. The yearly costs of acquiring and maintaining a collection of these tools total into hundreds of dollars, or thousands if starting a collection. A complete set of Index Medicus through 1968 costs $2450. A yearly subscription to the Science Citation Index is $1250. For all 24 sections of Excerpta Medica the cost is $950 per year. (4) If the hospital librarian knew (i) which of these tools was the most efficient source for verifying citations, (ii) what percentage of the requests that would be generated could be supplied from the library's title holdings, and (iii) what percentage of the requests made are for current and older material, decisions could be made on what to purchase and what to retain. In other words, a hospital could identify its library facility as being able to perform at the general level of providing access to the world's medical literature. This performance level, if it were possible to establish with any degree of accuracy, has further significance. Federal funds have been made available to develop a "national system of regional libraries". (5) Hospitals are the major interlibrary loan users of resource and regional libraries. Knowing the performance capability of the separate hospitals in a given area, regional and other resource libraries would be able to estimate

work loads in processing requests and to establish policies on which to contribute to the formation of dependable services provided through regional library networks.

The orientation of this study is to test a methodology as well as to provide data on which to base planning and management decisions for hospital health science library facilities and for library networks.

METHOD

The user population of the hospital library are members of a health care team all of whom have journals published by their professional societies. The assumption is that these journals are read collectively by hospital personnel and these journals are perhaps their major source of information from published literature. Several "basic" or "core" lists of journals suitable for general hospitals have been published recently. The list to serve as the source journals for this study was the one compiled by Yast which was derived from a survey of preferences among hospital health science librarians and directors of medical education. (6) A citation pool was then derived from the bibliographic articles from these source journals.* The signed articles given in the table of contents of each issue published dated for the first three months of 1968 were numbered (a total of 4670). A number was assigned to each citation of every tenth article (totaling 7607 citations). Using a table of random numbers two samples, each consisting of 150 citations, were compiled. Using student t-distribution the two samples were tested to determine whether the dates of the citations were drawn from and representative of the sample universe. The test indicated that the two samples were positively correlated and that other samples drawn from this citation pool would show a significant deviation at less than 1%.

Each of the journal citations of the sample was verified, that is, an attempt was made to attain full bibliographic information; arthor's name, article title, journal title, volume, year, and inclusive paging in Index Medicus (IM), Quarterly Cumulative Index Medicus (QCIM), Current List of Medical Literature (CL), Cumulated Index Medicus (CIM), Excerpta Medica (ExM), and Science Citation Index (SCI), through 1968. Neither the source index nor the citation index of SCI gives "full" bibliographic information, however, the source index does provide the author's name, article title, source volume, beginning page and year. The verification was attempted in ExM only for the first 150 citations of the sample because the need to search through each section was felt to be too time consuming for the purposes of this study.

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* Yast's list included 90 titles, however, The "Archives of Otolaryngology" was inadvertently missed in preparing the sample.

Following verification, the data were analyzed through graphic means. Tables were drawn to afford a means of comparing the ability to verify the citations in each tool in terms of actual numbers, by year, and in cumulative percentages. Tables were also drawn to indicate by year the number of citations published in titles comprising the list of 89 source journals as opposed to non-source journals and to indicate the percentage of the sample that was cited in source and non-source journals. The amount of literature verifiable by year, independently as well as in various combinations of the tools, was charted in terms of cumulative percentages, along with the cost of attaining each level of performance. Lastly, a table was drawn to indicate the performance of the tools on those citations dated within the years of publication of each tool as compared with the total number of sample citations.

FINDINGS AND DISCUSSION

The 89 journals published within the quarter studied produced 4670 signed articles or about 18,700 per year. Extrapolating from the sample of 7607 citations, these articles would produce bibliographies with 304,000 citations. Some of these citations must be duplicated, but from the sample of 300 drawn, no duplications were found and hence there is no way from the data of the study to determine how many are duplicated. Since 88% of the sample consisted of citations to journals, about 267,500 references to journals would be generated during the year by source journals. If the sample is representative of this group of source journal bibliographies, then further observations can be made. A little less than half (47%) of the journals citations would be to journal titles other than the source journals; each source journal is cited almost twice as often as the complement of other than source journals; that is, 51 of the source journals were cited, but for less than half the citation it took 85 additonal titles (See Table 1). Relating this distribution with the frequency distribution of the dates of the citations (Table 2), it can be estimated that for any randomly selected bibliography close to 90% of the citation would be no more than 15 years old; 75% would be 10 years old or less. (7) Or, to state it another way, a library owning a core collection would on the average be able to supply between two and three journal articles out of every 10 found in the bibliographies if it maintained a five year file, four if it maintained a 10 year file, but to insure that one half were available, the library would have to maintain a complete file of all the source journals.

The difference in ability to supply a document between keeping a 10 year file and a complete file appears small. Although precise figures are not possible to give, it has been calculated with varying degrees of sophistication that so long as a library does not borrow a volume of a given journal title more than six times per year, it is probably cheaper to borrow than to buy and store the title. (8)

Table 1

Number of Citations per Source and Non-Source Journal Titles

No. of Citations	No. of Source Journals	No. of Citations from Source Journals	No. of Non-Source Journals	No. of Citations from Non-Source Journals
0	38	-	-	-
1	18	18	61	61
2	16	32	15	30
3	5	15	4	12
4	4	16	4	16
5	3	15	-	-
6	-	-	1	6
7	1	7	-	-
8	1	8	-	-
9	2	18	-	-
10	-	-	-	-
11	1	11	-	-
Total	89	140	85	125

Table 2. Frequency Distribution of Citations by Year in Source and Non Source Journals

Year	Number of Citations Source Journals	Cumulated Total of (2)	Cumulated % of (3)	Non Source Journals	Cumulated Total of (5)	Cumulated % of (6)	Total Citations	Cumulated Total of (8)	Cumulated % of (9)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1967				1	1	<1	1	1	<1
1966	17	17	6	6	7	3	23	24	9
1965	15	32	12	19	26	10	34	58	22
1964	22	54	20	15	41	15	37	95	36
1963	13	67	25	9	50	19	22	117	44
1962	17	84	32	6	56	21	23	140	53
1961	6	90	34	14	67	25	17	157	59
1960	4	94	35	3	70	26	7	164	62
1959	9	103	39	8	78	29	17	181	68
1958	2	105	40	7	85	32	9	190	72
1957	2	107	40	6	91	34	8	198	75
1956	4	111	42	2	93	35	6	204	77
1955	5	116	44	4	97	37	9	213	80
1954	4	120	45	3	100	38	7	220	83
1953	3	123	46	5	105	40	8	228	86
1952	1	124	47	1	106	40	2	230	86
1951	1	125	47	3	109	41	4	234	88
1950	1	126	47	1	110	41	2	236	89
1949	3	129	49	2	112	42	5	241	91
1948	2	131	49	3	115	43	5	246	93
1947		131	49	1	116	44	1	247	93
1946	1	132	50		116	44	1	248	93
1945	1	133	50		116	44	1	249	93
1944	1	134	51		116	44	1	250	94
1943	1	135	51		116	44	1	251	94
1941	2	137	52	1	117	44	3	254	96
1939				2	119	45	2	256	96
1936				1	120	45	1	257	96
1935	1	138	52				1	258	97
1932	1	139	52	1	121	46	2	260	98
1927				1	122	46	1	261	98
1923				1	123	46	1	262	99
before 1920	1	140	53	2	125	47	3	265	100

The number of source journals published during specific periods is given in Table 3. The actual shelf space needed to store these source journals was measured at the Wayne State University Medical Library. Although binding practices vary from library to library; that is, the thickness of a volume varies, the figures given in Table 3 are probably representative of the shelf space required in most libraries to store one copy of this core collection of journals. If it can be assumed that the sample citation can be used as a model of the use of a core collection, then a "space utilization index" can be calculated. The model year of citations to source journal sample was 1964; it can be expected, then, that the area where the 1964 file is stored would be used more than any other journal storage area. From Table 4 it can be seen that the space required to store 10 years old or less would be used between three and four times as frequently as that to store the journals from 11 to 15 years old. Each five or 10 year increment becomes less and less valuable from a user viewpoint and consequently more and more expensive for the library to maintain this storage area. For a library with a core collection that should choose to have complete files would find that the area to store the journals 40 years or older would be used 100 times less than the area to store the most recent five year file. Statements such as the latter which are based upon the manipulation of numbers which are, in turn, derived under specific conditions, should not be interpreted as a precise measure of reality. The figures give credence, in some measure, to the experience of librarians. The data of this study can be used to support the following general statements.

First, a hospital health science library which maintains a core collection of journals has a very creditable instrument through which health professionals can gain access to the scholarly record of medicine. Since only half the citations found in these source journals are references to these same titles, the question arises, what is the most efficient collection to maintain. Although hospital libraries may wish to have relatively large collections for prestige purposes, such prestige becomes a very expensive commodity. The relative use of expensive hospital space declines rapidly if more than a 10 year file of the core collection is kept. Under certain circumstances, a 15 year file might be rationalized as needed, but the cost of borrowing wanted articles published before those dates probably does not offset the cost of maintaining storage space because an interlibrary loan service has to be provided for material not owned in any event.

Second, resource libraries which are to provide documents through interlibrary loan to hospitals which maintain 10 year files of their core journals should expect that about 20% of their interlibrary loan requests would be for articles in these journals that are more than 10 years old.

Table 3

Space Needed to House Bound Source Journals

Years	No. of Source Journals Published During Period	Running Feet of Shelf Space *	Cumulated Total	No. of Shelves **	Cumulated Total	No. of Sections ***	Amount of Square Feet Needed to House Sections ****
1963-67	89	137	137	54	54	9	90
1958-61	89	129	266	52	106	9	90
1953-57	80	108	374	43	149	8	80
1948-52	75	99	473	40	189	7	70
1940-47	67	121	594	48	237	8	80
1930-39	58	159	753	64	301	11	110
1920-29	50	130	883	52	353	9	90
1910-19	34	37	910	15	368	3	30
1900-09	21	23	933	9	377	2	20
before 1900	15	100	1033	40	417	7	70

* Does not include space for current unbound issues

** Calculated as 35.5" shelves with 6" free on each shelf

*** With six shelves to a section

**** From Metcalf, K.D. Planning Academic and Research Library Buildings. New York, McGraw, 1965, pp.393-4.

Table 4

Space Utilization Index for Storage of Source Journals

Years	% of Citations in Period	Storage Space Required ($ft.^2$)	Utilization Index (2)/(3)	Cumulated % of Citations	Storage Space Required ($ft.^2$)	Utilization Index (5) (6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1963-67	48	90	.53	48	90	.53
1958-62	27	90	.33	75	180	.42
1953-57	12	80	.15	87	260	.33
1948-52	7	70	.1	94	330	.28
1940-47	4	80	.05	98	410	.24
1930-39	1	110	.009	99	520	.19
before 1929	1	200	.005	100	720	.14

Within the past two years, six separate lists of core journals for hospital health science or other clinical libraries have been published. Comparison of the actual titles in these lists shows a wide divergence. Differences in actual titles of a "core" list does not deny the usefulness of any one of them, or that given the conditions under which this study was conducted that the data would not be similar. (9) If one of the functions of a hospital health science library is to make the entire scholarly record available to the professional staff of the hospital, then it must establish an interlibrary loan service. Utilizing the data of this study, up to one-half of the possible sources of information from journals that might be requested by professional staff would not be owned by the hospital. Securing an item through interlibrary loan requires that the borrowing library follow certain procedures, the most important is that the documents requested be verified bibliographically in some secondary source, or at least the source of reference to the requested document be given. The purpose of this requirement is to insure accuracy of the citation; the cost to the lending library to process an inaccurate request is as much (or more) as processing a request that can be filled. (10)

The second part of this study was to determine a possible performance expectation in verifying citations for interlibrary loan service of a hospital library owning a core collection. Three conditions should be noted.

1. Although a library with a 10 year core collection should be able to supply up to 40% of the requests that might generate from the bibliographies in this collection, this ideal condition does not exist because not only may a wanted item be in circulation, but unfortunately, an uncontrollable situation in every active library is that (i) items are missing, (ii) misshelved, or (iii) perhaps misappropriated by a user. A hospital health science library must, on occasion, borrow documents it theoretically owns.

2. No two hospital health science libraries own the same core collection; this study is an effort to make generalizations about the utility of core collections, not a specific core collection.

3. Just as a hospital library can not be expected to own all journal titles, it can not be expected to own an entire file of even the most important bibliographic verification instruments.

The expectation of the users of index and abstract journals is that these instruments are as complete as possible within the definitions of their coverage. Table 5 summarizes the coverage of each of the source journals during the years published and the other

Table 5

Journals from Sample Listed as Indexed or
Abstracted in Five Bibliographic Services

Years	No. of Source Journals	Number listed as Indexed				No. Other Than Source Journals	Number listed as Indexed			
		CIM	CL	QCIM	IM		CIM	CL	QCIM	IM
1958-67	89	89	-	-	-	85	76	-	-	-
1953-57	80	-	72	75	-	79	-	61	53	-
1948-52	75	-	60	71	-	71	-	40	50	-
1940-47	67	-	53	60	-	62	-	37	40	-
1930-39	58	-	-	52	-	59	-	-	34	-
1920-29	50	-	-	43	*	41	-	-	32	*
before 1900	15	-	-		12	10	-	-	-	10

* No list of journals indexed by IM between 1900-27 is available

Table 6

Verification of Journal Citations in Four Index Instruments

Year	Source Journals: No. of Citations	Source Journals: No. Verified IM	QCIM	CL	CIM	Source Journals: Total Verified	Source Journals: Cumulated % Verified *	Other than Source Journals: No. of Citations	Other than Source Journals: No. Verified IM	QCIM	CL	CIM	Other than Source Journals: Total Verified	Other than Source Journals: Cumulated % Verified *	Total Citations	Cumulated Total Citations	Cumulated % Citations *	Total Verified	Cumulated % Verified
1967								1				1	1	0.4	1	1	0.4	1	0.4
1966	17				15	15	5.6	6				5	5	2.3	23	24	9.0	20	7.9
1965	15				13	13	11.0	19				16	16	8.3	34	58	21.8	29	18.8
1964	22				21	21	18.4	15				10	10	12.0	37	95	35.8	31	30.6
1963	13				12	12	23.0	9				8	8	15.1	22	117	44.1	20	38.1
1962	17				17	17	29.4	6				6	6	17.3	23	140	52.8	23	46.8
1961	6				5	5	31.3	11				9	9	20.7	17	157	59.2	.14	52.1
1960	4				4	4	32.8	3				3	3	21.9	7	164	61.9	7	54.7
1959	9			7	2	9	36.2	8			2	5	7	24.5	17	181	68.3	16	60.7
1958	2			2		2	36.9	7			5		5	26.4	9	190	71.7	7	63.4
1957	2			2		2	37.7	6			4		4	27.9	8	198	74.7	6	65.6
1956	4		3	4		4	39.2	2			1		1	28.3	6	204	76.9	5	67.5
1955	5		5	5		5	41.1	4		4	4		4	29.8	9	213	80.3	9	70.9
1954	4		4	4		4	42.6	3		1	2		2	30.6	7	220	83.0	6	73.2
1953	3		3	3		3	43.8	5		5	5		5	32.4	8	228	86.0	8	76.2
1952	1		1	1		1	44.2	1							2	230	86.7	1	76.6
1951	1		1	1		1	44.5	3		2	3		3	33.6	4	234	88.3	4	78.1
1950	1		1	1		1	44.9	1							2	236	89.0	1	78.4
1949	3		3	3		3	46.0	2		1	1		1	33.9	5	241	90.9	4	80.0
1948	2		2	2		2	46.8	3		1	2		3	35.1	5	246	92.8	5	81.8
1947								1		1	1		1	35.5	1	247	93.2	1	82.2
1946	1		1	1		1	47.1								1	248	93.5	1	82.6
1945	1		1	1		1	47.5								1	249	93.9	1	82.9
1944	1		1	1		1	47.9								1	250	94.3	1	83.3
1943	1		1	1		1	48.3								1	251	94.6	1	83.7
1941	2		2	2		2	49.0	1		1	1		1	35.8	3	254	95.8	3	84.9
1939								2		2			2	36.6	2	256	96.6	2	85.6
1936								1		1			1	36.9	1	257	96.9	1	86.0
1935	1		1			1	49.4								1	258	97.3	1	86.4
1932	1		1			1	49.8	1		1				37.3	2	260	98.1	2	87.1
1927								1	1					37.3	1	261	98.5	1	87.5
1923								1	1					38.0	1	262	98.8	1	87.9
1917								1	1					[illegible]	1	263	99.2	1	88.3
1914	1	1				1	50.2								1	264	99.6	1	88.6
1908								1	1				1	38.8	1	265	100.0	1	89.0
	140	1	31	41	89	133		125	4	20	31	63	103		265				

* Does not include duplicate verification

journals cited in the sample bibliography. For example, all the source journals were listed as indexed by CIM and all but 12 of the other than source journals of the sample were listed as indexed.

The four most common index publications for medical literature cover different time periods some of which overlap. Because of the specialized nature of Excerpta Medica and of Science Citation Index the data on the verification of the sample in these instruments are discussed separately. From Table 6 it can be seen that no one instrument can verify all the citations for the period it purports to cover. What is more discouraging, even if a library owned complete files of these indexes as far back as 1900, only 90% of the citations could be verified. Of more significance to the hospital health science library is that even though CIM theoretically indexes all the source journals, there were seven citations that could not be verified, (that is, there were 94 citations with a publication date of 1960 or later and only 87 could be verified in CIM). Of the 70 citations in other than source journals CIM could verify only 58, a rate of 83%. (See Table 7) Clearly, the most prestigious bibliographic control instrument cannot be considered to be complete. If a five year file of CIM is kept, only 38% of the citation pool could be verified; a ten year file would bring the total up to 55%. Table 7 gives the relative value of each bibliographic instrument for the verification of citations of the sample.

Although it is clear that a hospital health science library should own CIM, an important point can be made from Table 6. The question is often asked whether a hospital should purchase the cumulated volumes of Index Medicus. If the hospital should decide not to make such an investment and keep only the current year, it is all but a useless instrument for bibliographic verification since only one out of 265 citations could be verified in the current year. An eight year file of Index Medicus does make it possible to verify 55% of the citations but the task of verifying would be horrendous if the cumulated volumes were not purchased. In other words, to arrive at the 55% performance level, eight cumulated volumes would have to be checked compared to 96 separate monthly issues.

Another frequently asked question is, "what instrument should be purchased for the decade 1950-59, CL, QCIM, or both?" From Table 7 it can be seen that to purchase CL for the years 1956-59 can bring the performance level of verification up to 65%; purchasing QCIM for 1950-56 adds another 13% to the ability to verify However, it should be noted that purchasing CL for 1950-59 allows the library to be just as proficient in verification, however, at twice the cost.

Table 7

Relative Value of Each Bibliographic Instrument to Verify Citations
Of the Year Covered
And for the Total Citation Pool

		Source Journals			Other Than Source Journals			Total Verified			Total Citations	
		No. of Citations	No. Verified	% of Total Verified	No. of Citations	No. Verified	% of Total Verified	No. of Citations	No. Verified	% of Total Verified	% of Total Citations	% of Total Verified
CIM	1960-68	94	87*	92	70	58	83	164	145*	88	59	55
CL	1956-59	17	15	88	23	12	52	40	27	67	15	10
CL	1950-59	32	32	100	40	26	65	72	56	80	26	22
CL	1941-59	43	41	95	47	31	66	90	72	80	34	30
QCIM	1950-56	19	19	100	19	15	79	38	34	89	14	13
QCIM	1926-56	32	31	97	31	20	65	63	52	83	24	20
IM	1897-1927	1	1	100	4	4	100	5	100	100	2	2
Ex M	1947-68**							247	180	74	93	64
SCI	1963-68***	140	140	100	125	125	100	265	100	100	100	100

* Two additional citations with a 1959 publication date were also verified in CIM

** Extrapolated from a sample of 129

*** Partial verification only

Table 8

Verification of 129 Journal Citations in Excerpta Medica

Year	No. of Citations	No. Verified	% of Total (129)	Cumulative Percent	*Cost per Volume	Cost per Set	Cumulative Cost
1966	9	6	4.0	4.0	34/sect.	952.00	952.00
1965	15	7	5.0	9.0	34/sect.	952.00	1904.00
1964	20	13	10.0	19.0	24/sect.	528.00	2432.00
1963	12	10	7.0	26.0	24/sect.	528.00	2960.00
1962	14	11	8.0	34.0	24/sect.	528.00	3488.00
1961	7	5	3.8	37.8	24/sect.	528.00	4016.00
1960	3	3	2.0	39.8	24/sect.	528.00	4544.00
1959	11	6	4.0	43.8	24/sect.	528.00	5072.00
1958	5	2	1.0	44.8	24/sect.	528.00	5600.00
1957	4	4	3.1	47.9	24/sect.	528.00	6128.00
1956	3	3	2.0	49.9	24/sect.	528.00	6656.00
1955	6	5	3.8	53.7	24/sect.	528.00	7184.00
1954	4	4	3.1	56.8	24/sect.	528.00	7712.00
1953	5	5	3.8	60.6	24/sect.	528.00	8240.00
1952	1			60.6	24/sect.	528.00	8768.00
1951	2	1	.77	61.4	24/sect.	528.00	9296.00
1950	2			61.6	24/sect.	528.00	9824.00
1949	3	2	1.0	62.4	24/sect.	528.00	10,352.00
1948	3	3	2.0	64.4	24/sect.	528.00	10,880.00

* Average cost per volume for 24 sections: Ulrich's, p.8, 12th ed., 1967-68 and Kraus Organizations' Catalog No. 120, pp.75-76.

Excerpta Medica. As noted previously, only the first 150 citations (with 129 journal citations) were used in verifying through ExM. The task of attempting to verify incomplete citations, many without titles so that the subject of the article might be guessed, is an exceedingly time-consuming task. Over 450 separate volumes had to be checked to insure that all citations which theoretically could be verified were identified. Table 8 shows the results of this attempt. Only 64% of the citations could be verified. Using a combination of CIM, CL, and QCIM, only 32 volumes would have to be examined and 82% of the citations would have been verified. More important, if viewed only as verification instruments, a complete set of ExM costs $10,880 whereas the most expensive combination of the three other instruments would cost but $1715.00. (See Table 9)

Science Citation Index. SCI is designed for quite different purposes from the other bibliographic instruments so far discussed, and is not as useful as a verification instrument since it does not give a full citation. However, as an instrument to identify the existence of a document it clearly outclasses all other instruments singly or collectively since all citations were identified. If the sole use of any of these bibliographic instruments were for verification then the purchase of a complete file of SCI for $5,350 would indeed be the best investment for this purpose.*

Costs. If the entire files of the four instruments, CIM, CL, QCIM, and IM were purchased at current 1969 prices, the cost would be $6,201. Just as discussed above, it is obvious that this initial cost, plus the cost of storage, may not be a wise investment for a hospital health science library because the use of older volumes is small compared to the relative return in acquiring verification information. Table 9 attempts to relate performance levels of verification with cost of acquiring the instruments.** CIM is the only feasible instrument for a hospital library to purchase for verification purposes subsequent to 1960. An investment of $1300 would enable the hospital librarian to verify over 50% of the requests he is apt to receive. Another $300 for CL from 1957-59 increases the performance level to two-thirds of the requests. The 80% "level" of performance can be attained by the purchase of either CL or QCIM back to 1950. As already noted, back volumes of QCIM are less than half the cost of CL at 1969 prices. More important, QCIM is a much simpler, and hence more efficient, instrument to use for verification purposes than CL. Between 1941-49, CL was designed primarily as a current awareness instrument,

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* The annual cost of a subscription is $1250.00; the 1963 experimental volume is available for $350.00.

** Obviously, it costs an institution to maintain storage space for these volumes, but the relative cost compared to maintaining a core collection is small and is for this study disregarded.

Table 9

Cost of Four Bibliographic Instruments and Their
Relative Performance Level for Verification Purposes

Year	CIM			CL			QCIM			IM			
	Cost/ Volume	Cumulative Cost/ Year	Cumulative Verification Performance %	Cost/ Volume	Cumulative Cost/ Year	Cumulative Verification Performance %	Cost/ Volume	Cumulative Cost/ Year	Cumulative Verification Performance %	Cost/ Volume	Cumulative Cost/ Year	Cumulative Verification with CL	Cumulative Verification with QCIM
1967	165	165	<1										
1966	165	330	8										
1965	165	495	19										
1964	175	670	31										
1963	150	820	38										
1962	125	945	46										
1961	125	1170	52										
1960	125	1295	55			55							
1959				50	100	61							
1958				50	200	63							
1957				50	300	66			66				
1956				50	400	67	30	60	67				
1955				50	500	71	30	120	70				
1954				50	600	73	30	180	72				
1953				50	700	76	30	240	75				
1952				50	800	76	30	300	75				
1951				50	900	78	30	360	76				
1950				27.50	955	78	30	420	76				
1949				27.50	1010	80	30	480	78				
1948				27.50	1065	81	30	540	79				
1947				27.50	1120	81	30	600	79				
1946				27.50	1175	82	30	660	80				
1945				24.50	1224	82	30	720	80				
1944				24.50	1273	83	30	780	81				
1943				24.50	1322	83	30	840	81				
1942				24.50	1371	83	30	900	81				
1941				40.00	1420	84	30	960	82			84	82
1940							30	1020	82			84	82
1930-39							30	1560	85			87	85
1920-29							35	1800	85	48.50	339.50	87	85
1900-19										42.50	1062.00	89	87
1879-99										28.35	1685.70	89	87

Costs taken from "Johnson Reprint Corporation Catalog, 1968-69";
"Swets & Zeitlinger Catalog, No. 117, 1969"; and "Kraus Organanizations' Catalog, No. 120".

rather than as a bibliographic reference source. If a hospital feels that it should have a bibliographic instrument that covers the literature between 1941-49 it appears obvious that the choice should be to purchase QCIM because the cost is relatively the same. In any event, the question should be seriously considered whether the investment of a 10 year file of either index journals for a small increase in ability to verify citations is warrented. To secure bibliographic instruments before 1940 can be interpreted only as an effort to gain prestige for a hospital. Indeed, there may be instances where a teaching hospital supports a large research program, but the purchase of QCIM and IM for over $2000 would seem from the data of this study to be spent for more direct user services.

In summary, any hospital which maintains a core collection should have a minimum file of five years of CIM. To purchase the remaining years of CIM and the last three years of CL places the hospital library in an advantageous position. From both an economic and ease of use, if further back files of bibliographic instruments are purchased, QCIM provides the same proficiency as CL.

Planning and Management Use.

The data of this study can provide a basis for a hospital health science library to make decisions about some aspects of the quality of service which it wishes to support. It should be emphasized the space utilization index and the percentage performance levels can only serve as rough guidelines. These same guidelines, however, may also be of use to resource libraries. For example, assuming a hospital health science library maintains a 10 year core collection of journals and owns CIM and CL from 1957, then all a hospital library should ask of a resource or regional library is bibliographic assistance for no more than one-third of its requests. Similarly, at least two-thirds of all interlibrary loan requests initiated should be verified through a secondary source. On the other hand, the resource library on whom the hospital library must depend for unowned journals and bibliographic assistance should plan for and be able to deliver a dependable supporting service for up to one-third of the requests generated by health professionals in a hospital health science library. Even under the circumstance where a requesting library should own all the bibliographic instruments examined, there still could be as much as 10% of the interlibrary loan requests for which there could be no complete citation verification. More extensive investigation and more elaborate methodology than used in the study could perhaps establish a better quantitative measure of bibliographic assistance a regional library should provide in support of its library constituents.

DOCUMENT IDENTIFICATION

This study had two primary objectives, to determine (i) the relative value of a core collection of journals to identify documents for sources of information and (ii) the effectiveness of certain bibliographic instruments in verifying citations for the purpose of securing documents identified through core collection by interlibrary loan. The data as analyzed for this study reveal a situation which challenges assumptions of the completeness and the utility of bibliographic control instruments. An eight year file of core journals, assuming the same rate of bibligraphy production as this sample, would have close to 2,500,000 citations. Duplication of citations obviously exists which this study could not identify. However, an eight year file of CIM has indexed but 1,200,000 documents. Even if these 1,200,000 documents were perfectly indexed so that all relevant documents could be found in the same selective manner as those of the bibliography of articles in the core journals, there still would be 8% which could not be identified from the core journals and 17% from other than the core set of journals. Obviously, this kind of statement contains many flaws because to obtain a bibliography of relevant documents through a core set of journals, the original article must be identified in the first place. Searching through the indexes of 89 journals for an appropriate article cannot be considered a suitable method to search for information. The invention of index journals in the 19th century was to circumvent such tedious work. Our study has demonstrated that searches made using CIM to produce bibliographies have a 50% relevance rate. The question that this study brings up is the efficacy of searching through CIM for presumably all relative documents compared to identifying one or two specific documents and using the bibliographies of those articles for the location of documents they might contain. The data from this study do not provide answers relevant to the adequacy of information retrieval methods, but it does present questions.

1. CIM apparently does not list or index all the articles of the journal titles it purports to cover, further, some of these "missed" articles are ones which authors deem necessary to identify in reporting their work. Are the indexing standards of CIM less than optimal? Or did the sample drawn include a number of articles that would be considered outside the scope of CIM?

2. Are bibliographies of articles a suitable source for locating information? Further, for any particular study are these bibliographies any more "relevant" than one produced through a CIM search?

3. Although bibliographers usually apologize for their inability to identify all articles, do the data of this study indicate a tolerable lower limit for information retrieval purposes in a hospital environment?

4. Although the bibliographic instruments studied identify at most 90% of the documents authors quote in a core set of journals, is it possible to also say that given any information problem that would arise in a hospital, could these bibliographic instruments serve to identify 90% of the documents which might contain information related to the information problem?

SUMMARY AND CONCLUSIONS

Analyzing a citation sample generated from one quarter's production of a core set of journals suitable for a hospital health science library discloses the following observations and tentative conclusions:

1. A core set of journals lists a large number of citations producing a praiseworthy source of possible information.

2. One-half of the journal citations are to core journal titles themselves.

3. Of the journal citations to the core titles, 45% are five years old or less, 75% ten years or less, 90% are 15 years old or less; to arrive at near the 100% level, a 70 year file of the core journals would have to be maintained.

4. Translating these percentages into storage space, and assuming the use of journals were perfectly correlated with the frequency of citation by date, a five year file would result in the most efficient use of space; a second five year file would be used 60% less than the first five years. With the present cost of space in hospital libraries, there does not appear to be any justification on a use basis for a hospital health science library to ever keep journals beyond a fifteen year period because the cost of building and maintaining the storage space would be far more expensive than borrowing such older items through an interlibrary loan arrangement.

5. Nearly one-half the journal citations are to other than the core set of journals, and, assuming other samples to be similar, it takes twice as many titles to produce the same number of citations.

6. An interlibrary loan service is an absolute necessity for a hospital health science library to secure even current material.

7. Since one of the requirements of the ALA Interlibrary Loan Code is that requests made for documents from other libraries should be verified, a hospital health science library must have bibliographic control instruments; the only currently produced index journal is CIM.*

8. A one year file of CIM is all but useless as a verification instrument since less than 1% of the citations from the source journals can be identified.

9. A nine year file of CIM (1960-68) is able to verify only 83% of the citations from other than source journals for citations dated 1960 and later and only 55% of the total citations generated from the core list of journals.

10. The purchase of the 1956-59 volumes of CL would increase the ability of a hospital health science library to verify citations by 10%.

11. It is clear that if it is deemed desirable for a hospital library to be able to verify citations at the 80% level it is better to purchase (at 1969 prices) the file of QCIM from 1950-56 rather than to get the CL volumes from 1950-55 because (i) from this study both are similar in performance ability for verification, (ii) the QCIM volumes are considerably cheaper, and (iii) QCIM as a bibliographic instrument is easier to use.

12. ExM is a poor instrument for a hospital health science library to purchase if its major use is for verification not only because of its cost, but also because of the difficulty to use for this purpose.

13. SCI is the most useful verification instrument since 100% of the journal citations of the sample were identified although the verification is not complete.

14. Just as the question arises with how long a file of journals should be kept, the similar question should be asked about how long a file of bibliographic instruments should be owned; because of the cost and the relatively little use, it does not appear justifiable for patient care and education purposes because of the (i) cost of storage and purchase and (ii) the relative little use per volume that a hospital health science library should own more than a 20 year file of the bibliographic instruments examined in this study.

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* The Abridged Index Medicus is to begin publication January 1970. This publication will have decided advantages over CIM for identification of articles from core collections, it will be of little value as a verification instrument--there is no need to verify items that are owned.

Projections of the quantity and quality of service expected from a hospital library are essential elements of regionalism which have become pervasive trends among libraries of biomedical and health care institutions. The regional library is expected to have facilities of sufficient depth and scope to supplement the services of other libraries within the region served by it. Its services may include loan of books, copies of journal articles, reference and bibliographic services, and the production of a union catalog of books and periodicals in the collections of libraries in the region served. In order for these services to be adequately provided, the regional librarian should have knowledge of the potential need for document delivery and reference service for the libraries within its region so as to minimize problems relative to collection, personnel, equipment and other facilities. In turn, the hospital librarian should have some knowledge of the demand for literature and its source so as to maintain a collection of current materials in support of patient care as well as educational and training programs of the hospital. This knowledge will also prove useful in the process of retiring parts of the collection, or composing and revising serials acquisitions policies. These are but a few examples of how such information can be adapted to individual hospital library purposes. It must be realized that this study focused only on one problem and identified other problems that need to be studied; that is, tools most effective in the verification of books and monographs and the assessment of indexing/abstracting services from a subject approach.

Policy and practice are two concepts in the field of medical librarianship that are frequently subject to change. One way to cope with this inherent trait is the formulation of logically founded methods of assessment which afford the librarian an opportunity to maintain checks and balances. This report has described and explained the findings of one such method in the interest of giving more credibility to the foundation of present policy and practice.

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